

## Appendix 6

# International Emission Standards for Heavy-Duty Vehicles

Heavy-duty on-road diesel vehicles represent the predominant mobile source of BC in most areas although nonroad diesel, locomotives and commercial marine can also be significant. The following discussion addresses emission standards in other parts of the world.

Outside the United States, Europe, and Japan, other nations adopt heavy-duty engine emission standards developed by these governments using schedules determined by legislative or executive standards. As noted earlier, Canada generally adopts U.S. standards on a timeframe similar to the United States, Australia also bases its national standards on those developed in the United States, Europe, or Japan. Outside these nations, other countries adopt emission standards, generally based on European standards, albeit on a different time frame. As discussed in Appendix 4, countries must ensure that fuel quality is requisite to allow emissions-reduction technologies to be implemented.

A number of countries have adopted schedules for phasing in PM emission standards for heavy-duty diesel engines that are likely to require advanced aftertreatment, such as a DPF, to meet the relevant national standard. In the Americas, Brazil's PROCONVE P7 standards beginning in the 2012 model year are likely to require advanced aftertreatment. Russia has adopted standards based on EURO IV starting in the 2010 model year and standards based on EURO V in the 2014 model year. In the Beijing area, China adopted standards equivalent EURO IV in 2008, and has proposed adoption of EURO V-equivalent standards in 2012. In addition, several countries that have applied for membership in the European Union will adopt EURO standards if accepted. These countries include Croatia, Iceland, Macedonia, and Turkey. Other potential candidate countries that have not formally petitioned for EU membership include Albania, Bosnia and Herzegovina, Kosovo, Montenegro, and Serbia.

Numerous other countries have adopted or proposed heavy-duty engine emission standards equivalent to earlier U.S. or EURO emission standards. In the Americas, these countries include Argentina, Brazil, Chile, Mexico, and Peru. In the

western Pacific and Asia, these countries include China, India, the Republic of Korea, Singapore, and Thailand. In Europe outside of the European Union, Russia and Turkey have adopted earlier EURO standards. These countries are making progress in reducing BC emissions from heavy-duty vehicles.

Figures A6-1, A6-2, and A6-3 show a graph of how PM emission standards are changing over time in the Americas, Asia and Australia, and Europe, respectively.<sup>1</sup> The figures also include trend lines, indicating the general trend of emission standards over time. As illustrated, most countries with emission standards in place have introduced progressively more stringent standards over time. The scatter around the trend line of each country reflects differences in standards based on vehicle type (truck vs. bus), test procedure (e.g., operating cycle), and/or location (e.g., urban vs. rural).

Beyond nations that have regulations with emission standards, other nations have been addressing vehicle emissions in some manner. Some other nations are adopting emission standards for light-duty vehicles, generally based on EURO standards. Others have eliminated or are scheduled to eliminate lead from gasoline, which enables the implementation of standards to reduce tailpipe emissions using catalytic aftertreatment. An example of this progress is found in Africa, where all nations have eliminated lead in gasoline. Others have banned the import of light-duty vehicles without a catalytic converter or established opacity testing requirements for cars, trucks, or scooters. This progress suggests room for additional technology-based approaches to reducing BC emissions.

Many other countries lack any emission standards. The reasons for their lack of emission standards may be attributable to several causes, including insufficient governmental capacity, poverty and other economic factors, and government policy. Many such countries face many other problems related to economic development, public health, violence, and authoritarian rule. Addressing BC from motor vehicle emissions in these locations may require attention to factors other than technology.

<sup>1</sup> See <http://www.dieselnet.com/standards> for more information.

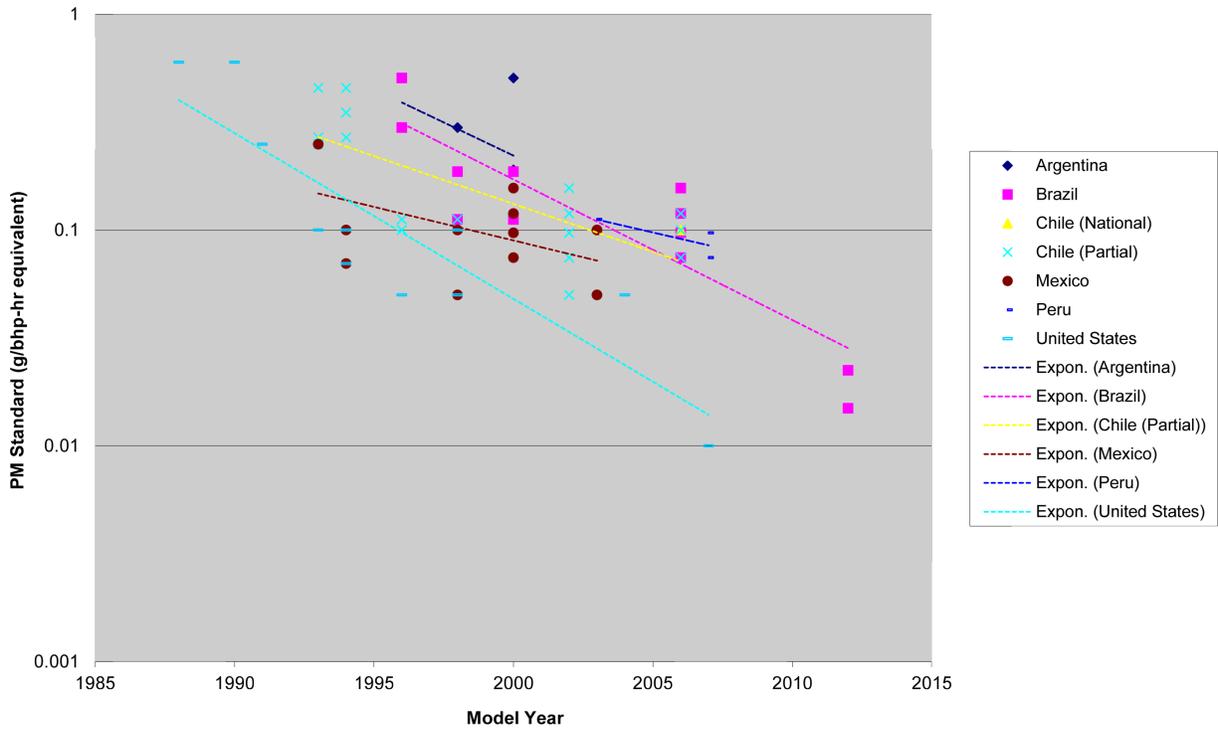


Figure A6-1. Heavy-Duty Highway Diesel PM Emissions Standards in the Americas and the Caribbean (Logarithmic Scale). (Source: U.S. EPA)

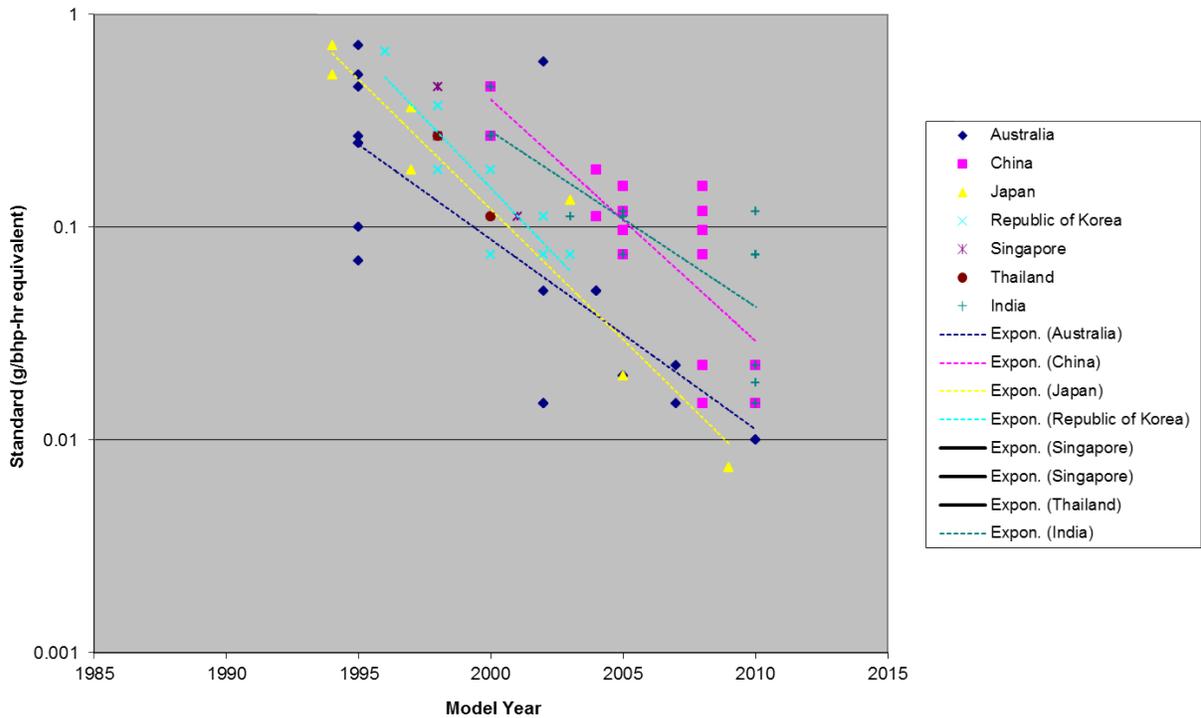


Figure A6-2. Heavy-Duty Highway Diesel PM Emissions Standards in Asia and Australia (Logarithmic Scale). (Source: U.S. EPA)

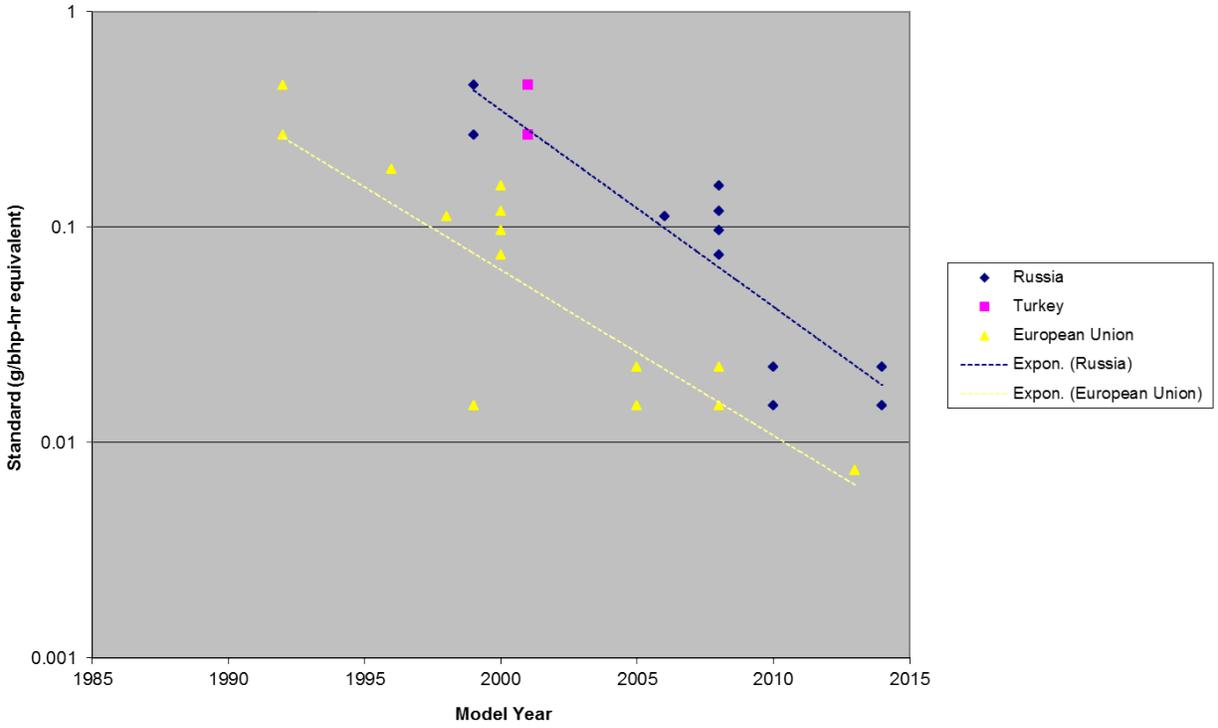


Figure A6-3. Heavy-Duty Highway Diesel PM Emissions Standards in Europe (Logarithmic Scale).  
 (Source: U.S. EPA)